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ABSTRACT

There has been a recognized need to understand the basis of quality teaching at the secondary school level. The Questionnaire on Teacher Interaction (QTI) was developed by T. Wubbels, H. A. Creton, and H. P. Hooymayers in the 1980s to address teaching quality at the high school level. A modified version of the QTI, the Professor Interpersonal Teaching Behavior Inventory (PITBI) has been developed to study college student perceptions. A reliability and validity study of the PITBI was conducted. Participants were graduate students in a university's college of education. Factor analysis revealed that 40 of the original 64 items were not relevant to the professor's interpersonal teaching behavior, an expected result because the original instrument was developed for high school students. Retained items factored into five factors, and these factored to one factor identified as Interpersonal Communication Teaching Behavior. Correlational relationships between retained items and the relationships among items were identified. The construct validity of the PITBI is predicated on that of the QTI. Validity was best for the leadership and guidance subscale, and good for the helpfulness, and uncertainty subscales, but not valid for the temperament subscale. It is recommended that additional items be added to the subscales other than leadership and guidance to strengthen their reliability coefficients. The validity of the instrument is based on the validity of its subscales. (Contains 31 references.) (SLD)

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The Establishment of the Reliability and Validity of the Professor Interpersonal Teaching Behavior Inventory

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Presented at the Annual Meetings of the SERA
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Introduction

Need and theoretical basis for study

There has been a recognized need to understand the basis for quality teaching in the 9-12 grade education setting. Quality teaching style is operationally defined as those actions, interactions and communications of the teacher with her/his students which are associated with positive cognitive and/or affective student outcomes. There have been numerous attempts to quantify the basis for quality teaching in the last 100 years. The first attempts were descriptive in nature and these studies were conducted to ascertain the characteristics of the effective teacher (see Barr & Emans, 1930; Charter & Waples, 1929; Hart, 1934; Kratz, 1896). None of these studies attempted to ascertain if the identified descriptors were associated with students learning outcomes either cognitively or affectively. The next series of investigations were identifiable by a number of key correlational studies with the central question of, is there a correlation or association between certain teacher behaviors and students' cognitive or affective learning outcomes or both (see Bennett, 1976; Brophy, 1973; Flanders, 1960, 1964, 1965, 1970 1970a; Good, Biddle and Bropy 1975; Haige and Schmidt, 1956; Medley, 1977, 1979; Ostland, 1956; Rosenshine, 1970; Stalling 1976; Soar, 1968; Veldman and Brophy, 1974; Wispe, 1951)? The current phase of this continuing investigation is the correlational studies between teachers' interpersonal communication teaching styles and the students cognitive and affective outcomes (see Brekelmans, 1990; Tuckman, 1980; Fisher, 1995; Henderson, Fisher and Fraser, 1995; Wubbels, Brekelmans and Hooymayers, 1991; Wubbels, Creton and Holvast, 1988; Wubbels, Creton and Hooymayer, 1985, 1987; Wubbels, Brekelmans, Creton and Hooymayers, 1989; Wubbels, Creton, Levy and Hooymayers, 1993; Wubbels and Levy 1989). The vital difference

between the first and second and the third phases is that in the first and second phases the teacher was seen as a collection of competencies, techniques, and/or traits. But in the third phase the teacher is viewed as an integrated whole educator interacting with the students in his/her classes and his/her interpersonal communication teaching style is seen as instrumental in effecting the student's' cognitive and affective learning outcomes.

The investigations in the third phase are predicated on two communication theories Leary's (1957) and Watzlawick, Beavin & Jackson (1967). Leary's text *Interpersonal Diagnosis of Personality* was developed in the 1950's and became the basis for treatment of various psychological infirmities. Watzlawick et al adapted Leary's theory in the 1960's and this adaptation became and continues to be the basis for family and group counseling and therapies. In the 1980's Wubbels, Creton and Hooymayers utilized Leary's theory as modified by Watzlawick et al human communication theory as the basis for their model on interpersonal communication teaching styles. Since the basis for the Questionnaire on Teacher Interaction (QTI) is Watzlawick's derivative of Leary's interpersonal communication theory and since both Watzlawick's and Leary's theories apply to communication types and not the communicators personal characters, the QTI can be utilized in the college setting to ascertain the correlations between the QTI's subscales and the students' cognitive outcomes.

Purpose and Significance

This modified version of the QTI will be identified as the Professor Interpersonal Teaching Behavior Inventory (PITBI). The purpose of this study is to conduct a reliability/validity study of the PITBI. The hypotheses of this study are; 1) Is each subscale of the PITBI valid?, 2) Is each subscale of the PITBI reliable?, 3) Is the PITBI a valid instrument? and

4) Is the PITBI a reliable instrument? The validity of the PITBI and its subscales will be determined by utilizing factor analysis. The reliability of the PITBI and its subscales will be determined by using Cronbach's alpha equation.

The PITBI would be a valuable instrument since it can be used to gather information on the perceptions of the students and those perceptions can be compared to the professor's perceptions. If the students are perceiving a different reality than the professor this would give the professor the knowledge needed to modify his/her interpersonal communication teaching style to better accommodate the students. Brekelmans, Wubbels, and Creton (1990) presented evidence that the students' perceptions of their instructor were correlated to their cognitive and affective outcomes in that instructor's class. Since the PITBI has the same theoretical basis as the QTI there should be a correlation between the students' perceptions of the professor and the students' cognitive and affective outcomes.

Literature review

The Leary (1957) model was developed to describe and measure specific interpersonal behaviors, primarily in a therapeutic setting. The Leary model was developed to measure both normal and abnormal behavior on the same scale, and it therefore can be applied both inside and outside the clinic (Wubbels, Creton, Levy, & Hooymayers, 1993). The Leary model identifies personality as the controlling factor in interpersonal behavior. The premise of the Leary model is that people use communication to accomplish two goals. The first goal is to avoid anxiety and the second goal is to feel good about themselves. The model further recognized that different persons will use different methods to achieve the two goals. The methods available are as numerous as the human personality; a person could use dominance or submission to obtain his/her goals. Using

the Leary model and Watzlawick's et al modifications as a template Wubbels, Creton, and Hooymayers (1985) developed the model for interpersonal teacher behavior. The term interactional teacher behavior, which is synonymous with the term interpersonal teacher behavior, was operationally defined as, "... behavior that refer to the relationship between the teacher and his students and which is expressed in the interaction between the personal communication in the classroom" (Wubbels et al. 1985, P. 3).

The Wubbel's et al. model for interpersonal teacher behavior directly adopted the two dimensional plane with 'Influence' on the vertical axis and 'Proximity' on the horizontal axis.

> The model maps interpersonal behavior with help of an influence-dimension (Dominance-Submission) and a proximity-dimension (Cooperation-Opposition). These dimensions are equally divided into eight sectors. Every instance of interactional teacher-behavior can be placed within the system of axes. The closer the instances of behavior are placed in the chart, the closer they resemble each other (and the more similar are their effects on the students). (Wubbels et al. 1985, P. 3)

See appendix F for a figure of the interpersonal teacher behavior model. See Appendix G for a figure of a series of nine types of interpersonal teaching behavior patterns.

This adaptation of the Leary (1957) model resulted in the eight sections, two in each quadrant in upper right; dominance-cooperation and cooperation-dominance, lower right; cooperation-submission and submission-cooperation and, lower left; submission-opposition and opposition-submission and the upper left; opposition-dominance and dominance-opposition. Each of these sections were identified by a specific teacher characteristic, these names are leadership, helping/friendly, understanding, student responsibility/freedom, uncertain,

dissatisfied, admonishing and strict. Each of these sections had a number of items on the Questionnaire on Teacher Interaction (QTI) associated with it, "From the item scores, scale scores are constructed ranging from 0.0 to 1.0. The higher the score in a sector the more significantly or frequently the behavior of the sector is displayed" (Wubbels et al. 1985, P.5).

The Wubbels et al. (1985) model is not predicated on one teacher behavior as the only significant correlate with student achievement. Instead, the Wubbels et al. model recognized that the teacher behavior will consist of all of the characteristics mentioned above. The other interpersonal teacher behavior characteristic was identified by Brekelmans (1989) and that was the trait of stability. Except for the first few weeks of the school year a teacher's interpersonal teaching style is stable across years and classes. These findings led to the development of the Questionnaire of Teacher Interaction (QTI).

Several studies were conducted to ascertain the validity and reliability of the QTI. These studies were conducted in The Netherlands, in the USA and in Australia. As a result of these studies, Brekelmans (1989) calculated an item internal consistency of greater than .70 on the individual level and an item internal consistency of greater than .80 on the class level. A determination of the QTI's generalizability was calculated using Cronbach's alpha and by treating the students' responses as items with a result of .92 for 206 classes (Brekelmans, 1989). Since a value of .80 or higher is considered adequate for generalization purposes, the Wubbels et al. (1985) model of interpersonal teacher behavior is generalizable to the population. Brekelmans's (1989) research also ascertained that the two factors, influence and proximity, accounted for approximately 80% of the variance on all the scales. The QTI can be answered by the students in an evaluation of their teacher's behavior, or the QTI can be used by the teachers to

self-report their behavior or identify their 'ideal' teaching behaviors. "Using this instrument, interactional teacher-behavior can be examined empirically. It is also suitable for giving feedback to teachers regarding their behavior" (Wubbels et al. 1985, P. 5).

The student's version of the model, the model for interpersonal student behavior, consisted of the same eight characteristics as the model for interpersonal teacher behavior and were further identified by a specific student behavior for each subscale in the instrument. These student behaviors are, leading group discussion, answering questions, listening to teacher, working independently, keeping a low profile, sulking, breaking rules and yelling, and changing the rules. The reliability and validity studies conducted on the Questionnaire of Teacher Interactions, incorporated the student model of interpersonal behavior and it was also found to be valid and reliable, with excellent generalizability (Wubbels, Creton, Levy & Hooymayers, 1993). The QTI has also been validated as a feedback instrument to facilitate the improvement of a teacher's interpersonal teaching style. In the Wubbels et al. (1993) model,

> teachers are normally asked to select two classes which vary in age, learning ability, or some other characteristic in order to receive feedback from the widest range of student groups. Ironically, QTI scores from these two different types of classes do not vary much, verifying the relative stability of teacher behavior. (p. 24)

In 1989, Wubbels and Levy conducted a comparative study of the Dutch version and the derived American version of the QTI. Both the Dutch and American version utilize students to measure aspects of the learning environment. The QTI was translated from the Dutch to the American language and as an added precaution, "the translation or the items was checked with a back-translation by an independent second translator (Wubbels & Levy, 1989, p. 4). The original

American version contained one hundred items from the original seventy-seven items in the Dutch original version. This increase in items was caused by more than one possible translation from several Dutch items. The American version was then inspected by Wubbels and Levy to ascertain if it was still in accordance with the original Leary (1957) model. According to the Leary model, "an item should correlate highest with the scale to which it belongs and lowest with the opposite sector"(Wubbels and Levy, 1989, p. 4).

Thirty three items were removed from the original one hundred American items because they did not correspond to the parameters of the assumptions of the Leary model. The second version was field tested and two more items were eliminated due to the same psychometric concerns. The final American instrument consisted of sixty-five items. Of these items fifty-nine were direct translations of their respective Dutch items. A series of item analyses were conducted to ascertain the American instrument's reliability. Seven of the eight section's reliabilities were above .90 and the other section's reliability was calculated to be .86. These values far exceed the minimal value of .60, that is the value that has historically been identified as the value at which the researcher does not attempt further improvement in the research instrument (Wubbels & Levy, 1989). These values also exceed the threshold for utilization in tests that will influence decisions about individuals (Wubbels & Levy, 1989). In a factor analysis the variation accounted for by the two factors, influence and proximity, was calculated to be 88.3% (Wubbels & Levy, 1989). From this data and analysis, "it can be concluded that the reliability of the American QTI is good and that there is some confirming evidence about the validity of the new instrument" (Wubbels and Levy, 1989, P.8).

Wubbels, Brekelmans, Creton and Hooymayers (1989) developed nine types of interpersonal teacher behavior patterns which were identified as 1) directive, 2) authoritative/friendly, 3) cooperative/tolerant, 4) repressive, 5) business-like, 6) uncertain/drudging, 7) aggressive/uncertain, 8) tolerant/uncertain and 9) friendly/tolerant. The reader can develop a clearer understanding of the implications of Wubbels et al. (1989) interpersonal teaching behavior model by studying these pictorial representations (see Appendix B) as well as the data tables.

Brekelmans, Wubbels, and Creton (1990) utilized the Questionnaire of Teacher Interaction (QTI) to investigate the question, is there a correlation between student perception of teacher behavior and cognitive and affective outcomes, in the context of a physics curriculum? There were two types of physics curriculum, the traditional curriculum and the PLON curriculum. PLON is a Dutch acronym for, Dutch Physics Curriculum Development. The traditional curriculum was designed to suit those students that were going to need physics in their college studies. The content was reflective of a simplified and dated university physics course. The teacher did not emphasize the practical aspects of physics and the students were not required to conduct any laboratory exercises (Brekelmans, Wubbels and Creton, 1990). The newer curriculum PLON was developed to, "create curriculum materials that stimulate activity learning, reality learning and participation learning" (Brekelmans, et. al., 1990, P. 338).

The researchers' discovered that there was no significant difference between the two curricula when they evaluated the students' cognitive and affective learning outcomes. There was a significant difference found between the types of interpersonal teaching style subsets and both cognitive and affective learning outcomes. Cognitive outcomes were measured with a

standardized and internationally developed test for physics subject matter. The researchers do not delineate the standardized test used in this research by cognitive nor affective levels of complexity. The test's validity was established by a high correlation between the teachers' in-class students' grades and the students' scores on the standardized physics test. "Further corroboration of the validity is obtained from the fact that the levels of the students abilities of the three school types are represented in the test scores (on a scale 0-100): MAVO 70, HAVO, 76, VWO 81" (Brekelmans et al. 1990, P. 339). The Dutch school system is stratified and the students' scored in these three types of schools should reflect this intellectual stratification. The scores that Brekelmans et al (1990) reported for the differing types of schools are indicative of the validity of the cognitive achievement instrument administered to the Dutch students in the three types of schools. The MAVO school type is the general secondary educational situation at the intermediate level. The HAVO school type is the general secondary education situation at the higher level and the WVO school type is secondary level education in preparation for university studies (Brekelmans, et. al., 1990).

The student's affective outcomes were ascertained by utilization of a questionnaire which targeted five areas of interest. These areas were represented by five scales: "appreciation of lessons, instructiveness, easiness, structuredness of lessons and subject matter and motivation for physics" (Brekelmans et al. 1990, p. 340-341). The affective instrument is still in the Dutch language and has not been translated using the procedures discussed earlier in the translation of the QTI.

In the cognitive domain, the teacher's interpersonal teaching behavior, for the section dominant-opposition was correlated to cognitive achievement at +.39, the higher the level of the

students' perceptions of teacher dominance the higher the students' cognitive outcome. The submission-opposition section was correlated to cognitive achievement at -.38, the higher the students' perceptions of the teachers submissiveness the lower the students' cognitive outcomes. Both of these correlations were significant at the $p < .05$ level. The other six teacher interpersonal teaching characteristics were not significantly correlated with student cognitive outcomes. The cognitive domain was not divided by cognition levels and the study does not address possible differences in significance and correlation as it pertains to the various cognition levels.

In the affective domain, the teacher's interpersonal teaching behavior was correlated with multiple affective outcomes. In the section dominant-cooperative, this type of interpersonal teaching behavior was positively correlated with appreciation of lessons (AP), instructiveness (IN), structuredness of lessons and subject matter (ST) and motivation for physics (MO). These correlations were significant at the $p < .05$ or less. In the section cooperation-dominant, this type of interpersonal teaching behavior was again positively correlated with appreciation of lessons (AP), Instructiveness (IN), structuredness of lessons and subject matter (ST) and motivation for physics (MO). These correlation were significant at $p = .05$ or less. In the section cooperation-submission, this type of interpersonal teaching behavior once again was positively correlated with appreciation of lessons (AP), instructiveness (IN), structuredness of lessons and subject matter (ST) and motivation for physics (MO). These correlations were significant at $p = .05$ or less. The next section submission-cooperation, exhibited a type of interpersonal teaching behavior that was positively correlated with only appreciation of lessons (AP), and easiness. These correlations were significant at the $p = .05$. The other three types of affective outcomes, instructiveness (IN), structuredness of lessons and subject matter (ST) and motivation for physics

(MO) were not significantly correlated toward a submissive-cooperative interpersonal teaching style. The section of interpersonal teaching style identified as submission-opposition was not significantly correlated to any of the students' affective outcomes. The sixth section under consideration, an opposition-submission interpersonal teaching behavior was negatively correlated with all the affective student outcomes. These correlations were significant at the p =.05 or less. The section identified as the opposition-dominant interpersonal teaching style was again negatively correlated with appreciation of lessons (AP), instructiveness (IN), structuredness of lessons and subject matter (ST). These correlations were significant at p =.05 or less. The last section dominant-opposition was negatively significantly correlated with easiness at p <.01, but all other student affective outcomes were not significantly correlated. These finding led to a general observation that a teacher's interpersonal behavior which falls to the right of the influence factor will be correlated with positive affective student outcomes. While the line of effectiveness for the cognitive realm is to the right of the axis with dominant-opposition on one end and cooperative-submissive on the other. Visually this is a rotation from the vertical orientation for positive affective student outcomes, to an orientation which is 45 degrees toward the left. This leads to a dilemma for the teacher because the most effective areas of interpersonal teaching style are mildly contradictory. The way out of this dilemma might be found through the comparison of the teachers' ideal teacher and the students' best teacher. The interpersonal patterns on the two-way matrix are very similar. Perhaps, the students value the cognitive outcomes more than their affective outcomes.

This data from the Brekelmans et al. (1990) study leads to the conclusion that the teacher that projects leadership is positively correlated to positive cognitive outcomes. The dominant-

cooperation (DC) section was also positively correlated to increases in four affective sets which are Appreciation of Lessons, Instructiveness, Structureness of Lessons and Subject Matter and Motivation. The other affective set was not significantly correlated. The other section related to DC the cooperation-dominant (CD) section was significant in all the same affective sets as was the DC section but, CD was found not to be significant with cognitive outcomes. The next quadrant , cooperation-submission (CS) and submission-cooperation (SC) were not significantly correlated with cognitive outcomes. The CS section was significantly correlated with the affective sets of AP, IN, ST and MO. The SC section was significantly correlated with the affective sets of AP and EA, all other pairs were insignificant. The next quadrant submission-opposition (SO) is negatively correlated with a negative cognitive outcome while the opposition-submission (OS) set was not significantly correlated to cognitive outcome. The SO set was not significantly correlated with any of the affective sets, while the OS significantly negatively correlated with all the affective sets. In the last quadrant, opposition-dominant (OD) was not significantly correlated with cognitive outcomes while the dominant-opposition (DO) set was positively correlated with cognitive outcomes. The OD section was significantly correlated with the affective sets of AP, IN and ST in a negative manner. The DO section was significantly correlated with only EA and that is a negative manner.

After closer examination of the results of the correlations of the teachers' interpersonal teaching behaviors and the cognitive and affective learning outcome, it is apparent that,

> if the teacher's aim is to promote both student achievement [Cognitive] and attitudes [Affective], they are pulled in opposite directions by the conflicting demands of the

sectors DO and SC. In order to promote higher achievement, teachers have to be stricter but, to promote better attitudes, they have to be less strict (Wubbels et al. 1993, P.7).

This problem, the contradicting needs of the students, is identified in the literature but, a solution has not been offered. The literature of teaching styles research has traveled through four distinctive phases. The first phase was concerned with describing the characteristics of the effective teacher. The attributes were identified through survey research but, there was not any attempt to ascertain if these teacher qualities were correlated to student learning outcomes. The second phase was a series of investigations into the various methodologies of teaching. Once a methodology was identified, the researchers then used that data set and frame work to develop teacher methodologies. The research into the various methodologies of teaching led to the investigation of process-product processes. The utilization of process-product processes are evident in the development of the teacher assessment instruments, such as the Texas Teacher Assessment System (TTAS). Currently, researchers (Brekelmans, Creton, Fraser, Levy, Wubbels and others) are trying to identify interpersonal teaching styles of teachers and ascertain the styles' effects on student cognitive and affective outcomes. This area has been pioneered by the research of Professor Dr. Wubbels in The Netherlands, Dr. Levy in the USA and Dr. Fraser in Australia as well as their colleagues. This research has not investigated the effect of interpersonal teaching behavior and the students' cognitive outcomes at Bloom's six taxonomic levels of cognition.

Methodology

Participants

The participants in this study were graduate students in the College of Education. The participants' ages ranged from 22-66 years of age, approximately two-thirds of the participants were female. Approximately 70% of the participants were members of the Anglo-American ethnic group and all the participants were working at the post baccalaureate level or higher.

The population from which the participants are drawn is identified as the graduate students population majoring in educational studies. The assessable population is the available graduate students attending classes at the College of Education during the fall semester of 1996.

Convenience sampling was utilized in this study, but care was taken to insure that an equal number of classes were drawn from both divisions of the College of Education.

The procedures and protocols of the Office of Research Services were adhered to and the research followed the AERA ethical guidelines for research. All participants were assured of confidentiality and anonymity. Plus, all participants were affirmatively informed of the unabridged right to quit at any time and without any penalty. All participants voluntarily completed a consent and release form before they were included in the study.

Instrument

Scoring Format

The instrument used in this study was a modification of the 64 item Questionnaire on Teacher Interaction (QTI). The author modified the QTI which is targeted toward a 9-12 American high school population into the Professor Interactional Behavior teaching Inventory (PITBI). The PITBI is a 64 item, 8 subscale instrument which assesses the students' perceptions

of their professors interpersonal communication teaching behaviors. The scoring format in each items is graded by the students with a range of A to E. All A's are assigned a value of 4 points, B's are valued at 3 points, C's at 2 points, D's at one point and E's at 0 points. For each subscale there are n number of items, each item has a potential maximum score of 4 points. To obtain the subscale's score the scorer would add the student responses together and divide by the maximum possible number of points. For example in the subscale Leadership there are seven items and the maximum score possible is 7X4 or 28. The student's responses would then be scored and divided by 28. The closer the student's responses were to 1.00, the more the student perceived that the professor demonstrated that trait.

Reliability and Validity of Original Instrument

The validity of the QTI is considered very good in the constructually and contextually modalidities. The reliability of the American version QTI were ranged from .76 to .88 at the individual level and .86 to .96 at the class level. This leads the research to the conclusion that the American version of the QTI is very valid and reliable with the proviso that it is more reliable at the class level than the individual level. There is not any evidence that factor analysis was used on the QTI. Rather positional correlations were calculated on each subscale in relationship to the other subscales. This was done because Leary's and Watzlawick's studies indicated that the correlations between the subscales would decrease as the distance between the subscales increased.

Procedures

After the PITBI instrument was distributed to the participants they were told to answer the questions using the formatted Likert scale present. The participants were reassured that their

participation was voluntary, that there was not any penalties for early withdrawal and that their identities and responses were confidential and anonymous. The participants completed the PITBI without a time constraint and all participants completed the PITBI within 20 minutes of starting the instruments.

Analysis

After factor analysis the items in the PITBI clustered under five factors, three of the factors are identified as leadership & guidance, uncertainty, and helpfulness. The last factor, temperament, consisted of two closely related factors which were identified as internal and external located temperamental acts.

The first factor under consideration, leadership, is represented by items, r03, r15, r32, r36, r37, r41 and r53 on revised PITBI. These items are renumbered r01, r02, r03, r04, r05, r06, and r07 in the further revised PITBI. The other items that were identified as indicators of leadership and guidance were found not to be applicable in the collegiate environment and were removed from the instrument. Cronbach's α equation was calculated for the leadership and guidance factor and the level of reliability was found to be .80 This level of reliability meets the requirements of generalizibility to the identified population which is .80. An alpha of .60 is required if the instrument is going to be used in formulating recommendations of actions or remedies. The leadership and guidance alpha of .80 exceeds this requirement and this subscale can be used to generalize to the identified population and to make recommendations of action to members of that population.

The next factor to be analyzed is factor uncertainty. Factor uncertainty is represented by items, r23, r38, r42, r55, and r64 on the revised PITBI. These items are renumbered r08, r09,

r10, r11, r12 on the further revised PITBI. The other items that were identified as indicators of uncertainty were found not to be applicable in the collegiate environment and were removed from the instrument. Cronbach's α equation was calculated for the uncertainty factor and the level of reliability was found to be .66. This level of reliability does not meet the requirements of generalizibility to the identified population which is .80. This requires that the researcher or reader exercise caution in generalizing to the larger diverse population. The generalizability of this subscale will be predicated on the level of homogeneity between the characteristics of the sampled population and the population to which the researcher/reader wishes to generalize. An alpha of .60 is required if the instrument is going to be used in formulating recommendations of actions or remedies. The uncertainty alpha of .66 exceeds this requirement and this subscale can be used to make recommendations of action to members of the groups under study, but care must be exercised in making recommendations toward the population due to an alpha level below .80.

The next factor to be analyzed is factor helpfulness. Factor helpfulness is represented by items, r04, r11, r13, and r48 on the revised PITBI. These items are renumbered r13, r14, r15 and r16 on the further revised PITBI. The other items that were identified as indicators of helpfulness on the earlier revision of the PITBI were found not to be applicable in the collegiate environment and were removed from the instrument. Cronbach's α equation was calculated for the uncertainty factor and the level of reliability was found to be ..66. This level of reliability does not meet the requirements of generalizibility to the identified population which is .80. This requires that the researcher or reader exercise caution in generalizing to a large diverse population. The generalizability of this subscale will be predicated on the level of homogeneity between the characteristics of the sampled population and the population the researcher/reader

wishes to generalize. An alpha of .60 is required if the instrument is going to be used in formulating recommendations of actions or remedies. The helpfulness alpha of .66 exceeds this requirement and this subscale can be used to make recommendations of action to members of the groups under study, but care must be exercised in making recommendations toward the population due to an alpha level below .80.

The next factor to be analyzed is factor temperament. Factor temperament is represented by items, r10, r16, r30, r43, r59, r61 on the revised PITBI. These items are renumbered r17, r18, r19, r20, r21, and r22 on the further revised PITBI. These items factor into two closely related subfactors which are identified as internal and external located temperamental acts. These factors are correlated with each other at the level of r=..67. The other items that were identified as indicators temperament on the earlier revision of the PITBI were found not to be applicable in the collegiate environment and were removed from the instrument. Cronbach's α equation was calculated for the temperament factors and the level of reliability was found to be ..55. If the factors were considered individually the found alpha levels were .51 for the internal location factor and .52 for the external location factor. None of these levels of reliability meet the requirements of generalizibility to the identified population which is .80. This requires that the researcher or reader exercise due caution in generalizing to a large diverse population. This subscale is the object of continuing research to further identify appropriate items which will increase the Cronbach's alpha level to appropriate levels above .60. The generalizability of this subscale will be predicated on the level of homogeneity between the characteristics of the sampled population and the population the researcher/reader wishes to generalize. An alpha of .60 is required if the instrument is going to be used in formulating recommendations of actions or

remedies. The temperament alpha of .55 does not meet this requirement and this subscale in it present form should not be used to make recommendations of action to members of the groups under study. Nor should it be used to make recommendations toward the population due to an alpha level below .60.

The next hypothesis is concerned with the validity of the PITBI instrument as a whole. If the subscales are valid and grounded in a proper theoretical framework, then the instrument as a whole will be valid. The PITBI is grounded in Wubbels et al work in interpersonal communication teaching behaviors. Since, this model and its predicates, Leary's and Watzlawick's models are valid, then this instrument is also valid. Evidence that would further indicate the validity of the PITBI is the factor pattern for the subscales of the PITBI. Factor analysis of the subscales reveal that all four subscales factor to one factor. The subscales, leadership & guidance and helpfulness factor at .81 and .85 respectively. The other two subscales, uncertainty and temperament factor at -.84 and .79 respectively. This is the pattern expected according to the literature review and analysis of the instrument's construction. The factor which all of the subscale are clustered under will be identified as professor's interpersonal teaching behavior.

The fourth hypothesis concerns the reliability of the instrument when it is viewed as a whole. If the subscales are reliable the instrument, which is composed of those subscale should also be reliable. Since subscale, temperament, is reliable at the .55 level, the instrument should be viewed as provisionally reliable.

Results

Factor Analysis

The results of this study will be discussed from five primary foci. These are factor analysis of the items in each subscale and the subscales themselves, correlation coefficients of all retained items and each subscales' items, reliability of the items in each subscale, ANOVA's of the subscales as dependent measures and three demographic descriptors as the independent measures, and any post hoc test due to the results of the ANOVAs.

The factor analysis of the items revealed that 40 of the original 64 items were irrevalent to the construct under study, the professor's interpersonal teaching behavior. This is an expected result of this study because the original instrument, Questionnaire on Teacher Interaction (QTI) was developed for the high school setting of grades 9-12. This study is an attempt to modify the QTI to the setting of post-baccalaureate college. Conti's (1986) study has shown that the post-baccalaureate population has a differing orientation toward scholastic activities. The retained items factored into five factors, the first factor is identified as, leadership and guidance, and eight items loaded on to it. These were items R03, R15, R32, R36, R37, R41, R53 and R57 and these items will be renamed L1, L2, L3, L4, L5, L6, L7, and L8 on the next revised issue of the PITBI. For this discussion and other item orientated discussions the original designations will be utilized. The items loaded on the factor with values ranging from .53 to .84, these values are relatively high and further identify the items as being associated with the leadership and guidance factor. The second factor is identified as, uncertainty, and five items loaded on to it. These were items R23, R38, R42, R55, and R64 and these items will be renamed U8, U9, U10, U11, and U12 on the revised issue of the PITBI. The items loaded on the uncertainty factor with values

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ranging from .53 to .74 are relatively higher and further the association between the items and the factor uncertainty. The third factor is identified as, helpfulness, and four items loaded on to it. These are items R04, R11, R13, and R48 and these items will be renamed H13, H14, H15, and H16 on the revised issue of the PITBI. The items' loadings to factor helpfulness ranged from .53 to .80 and these loadings are sufficiently strong enough to reinforce the assignments of the items to this factor. The fourth and fifth factors are identified as, temperamental, and six items loaded on to these factors. Four items R10, R16, R43, and R59 loaded to factor four which is further identified as professor centered temperamentally. These items are renamed T17, T18, T19, and T20 on the revised issue of the PITBI. The other two items R61 and R30 load on to factor five which is further identified as reflections of the professor centered temperamentally. The items are renamed T21, and T22 on the revised issue of the PITBI. The items' loadings on to the professor centered temperamentally factor ranged from .52 to .68 and the items loading on the reflections of the professor centered temperamentally factor ranged from .49 to .60, these two items also loaded to the professor centered temperamentally factor at values of .46 to .55 respectively. These associations will be further discussed and explored in the discussion and conclusions section of this paper. The final factor analysis conducted was on the subscales to ascertain if they factored to one factor as the theories and models of Leary and Wubbels et al predicted. All four subscales Leadership & Guidance, Uncertainty, Helpfulness and Temperament factored to one factor which is identified as Interpersonal Communication Teaching Behavior. The subscales loading of .85 for leadership & guidance, .87 for Uncertainty, .83 for Helpfulness, and -.83 for Temperament are relatively high loading values and further

reinforce the identification of these subscales to this factor, Interpersonal Communication Teaching Behavior.

Correlational Relationships

The next area of discussion is the correlational relationships between the retained items as a group and the relationships between the items retained for each subscale. The values can be viewed in appendix B and they will be summarized in this subsection of this paper. It is expected that the items that are identified as loading on to factors uncertainty and temperamental will be negatively correlated with the items that are loaded on to factors leadership & guidance and helpfulness. The corrleational matrix for all retained items is reflective of the above assertions. Since these items are loaded on to differing factors it is also expected that the items will have a higher internal correlation than external. This assertion is also supported by the correlational matrix of all retained items. The correlational matrices for subscales are, leadership & guidance .26 to .67; uncertainty .19 to .47; helpfulness .17 to .46; and temperamental -.02 to .28. All the internal correlational values for leadership & guidance, uncertainty and helpfulness were found to significant at p=< .02. The significance correlation values in the last factor temperament, which is underlain by two other factors, ranged from p=.00002 to insignificance.

The last correlational treatment in this study is the calculation of the correlation coefficients between the subscales of the PITBI instrument. This correlation is conducted to reaffirm the item by item correlation coefficients, if the items are related then the subscales built from those items will be related. Also, if Leary's and Wubbels et al theories and models are

correct there will be a positive correlation between the leadership & guidance and helpfulness subscales, a positive correlation between the uncertainty and temperament subscales, and negative correlations between the subscales leadership & guidance and helpfulness and the subscales uncertainty and temperament. The subscale correlation coefficients are supportive of both of these models and theories. The correlation calculations found that subscales leadership & guidance and helpfulness are correlated at .61, p=<.0009, subscales uncertainty and temperament are correlated at .57, p=<.0009. The correlations between leadership & guidance and either uncertainty or temperament were found to be -.55, p=<.0009 and -.48, p=<.0009 respectively. The correlations between helpfulness and either uncertainty or temperament were calculated to be -.61, p=<.0009 and -.55, p=<.0009 respectively.

Reliability

Cronbach's alpha was calculated for each subscale in the PITBI. This is the appropriate equation because the subscales are answered using a Likert scale which insures that the answers will not be dichotomous in nature. The subscale leadership and guidance consist of eight items identified as leadership and guidance, and these were items R03, R15, R32, R36, R37, R41, R53 and R57. These items will be renamed L1, L2, L3, L4, L5, L6, L7, and L8 on the next revised issue of the PITBI. The reliability coefficient calculated for this subscale is .85. The second subscale uncertainty consists of five items and these items are identified as R23, R38, R42, R55, and R64. The items will be renamed U9, U10, U11, U12, and U13 on the revised issue of the PITBI. The found value for Cronbach's alpha for the second factor is .66 The third factor is identified as helpfulness, and four items loaded on to it. These are items R04, R11, R13, and R48 and these items will be renamed H14, H15, H16, and H17 on the revised issue of the PITBI. The

alpha coefficient which was calculated for this subscale is .66. The last factor is underlain by two factors and it is identified as temperament, and six items loaded on to the two underlying factors. Four items R10, R16, R43, and R59 loaded to factor four which is further identified as professor centered temperamentally. These items are renamed T18, T19, T20, and T21 on the revised issue of the PITBI. The other two items R61 and R30 load on to factor five which is further identified as reflections of the professor centered temperamentally. The items are renamed T22, and T23 on the revised issue of the PITBI. Since the factors are related Cronbach's alpha was calculated using all six loaded items with a result of .55

ANOVA

An ANOVA was run on each subscale to ascertain the relationship if any between each subscale and the independent variables age, ethnicity and gender. Age was transformed into a dichotomous variable by calculating the participants' medium age and dividing the participants into two groups. Group one (n=87) is any person at or under the participants' medium age and group two (n=70) is any persons over the participants' medium age. Ethnicity was retained as a noncontinuous variable with 5 categories and gender is a naturally occurring dichotomous variable. The ANOVA used is an unique sums of squares type with all the main effects entered simultaneously. The results were insignificant for all the main effects and the subscales, the higher order interactions were suppressed by SPSS because of a singular matrix. Since the ANOVA's resulted in insignificant results there were not any post hoc test conducted on the data.

Discussion and Conclusions

The discussions and conclusions of this paper will follow the presentation of the hypotheses in the first section of this paper. The first hypothesis is concerned with the question, is each subscale of the PITBI valid? Validity of an instrument or a subscale associated with that instrument can be determined constructively and also by factor analysis. This paper utilizes each type of validity determination. This instrument, PITBI, is a derivative of the Questionnaire on Teacher Interaction (QTI). The QTI was found to have construct validity because it was developed on Leary's 1957 theory on interpersonal communication and on Watzlawick modification of Leary's theory. Watzlawick modification was instrumental in the development of the basis for family group therapy. Since the PITBI is predicated on the QTI and the QTI has been found to be constructually valid, this leads to the assertion that the PITBI is also valid. Furthermore, the foundation theory and models are not dependent on the participants ages or educational level, the PITBI will be founded on the two underlying continuam identified by Leary, Watzlawick, and Wubbels et al. This assertion does not mandate that the PITBI retain all the items present on the QTI and it is probable that items will have to be re-written or omitted. The second method used to ascertain the validity of the PITBI is the utilization of factor analysis. Factor analysis is a mathematically based procedure used to identify which items load into the underlying factors. Factors are inferential entities and as a result factors can not be directly measured or accessed. Their existence can be infered with a high probability of certainty from the loading values of the items which are clustered onto a certain factor and if the item(s) load on to one or more factors.

In this study eight items loaded on to the factor leadership & guidance. These loadings ranged from a low value of .53 to a high value of .84. Also, these items loaded only on the leadership & guidance factor. These two validity testes with two subtests for each major test leads the researcher to ascertain that the validity of the subscale leadership & guidance has been established. The same reasoning can be used to establish the validity of the other three subscale of the PITBI. Since the PITBI is predicated on the QTI and the QTI has been found to be constructually valid, this leads to the assertion that the PITBI is also valid. A subsidiary assertion is that the subscales of he PITBI will be as constructually valid as the PITBI itself. Moreover, the assertion that the PITBI's foundation theory and models are not dependent on the participants ages or educational level is equally true for the PITBI's subscales. This assertion does not mandate that the subscales retain all the items present on the QTI and it is probable that items will have to be re-written or omitted. The other three subscale are identified as helpfulness, uncertainty and temperamental. The items of each subscale was analyzed using factor analysis. The factor analysis of the subscale helpfulness resulting in four of items loading at values which ranged from a low of .53 to a high of .80. Another indicator of the validity of the helpfulness subscale is that none of the items loaded on to any other factors. The subscale uncertainty factor analysis results were similar to the helpfulness analysis. After factor analysis five items loaded on to the factor uncertainty with a range of .53 for the low value and .73 for the high value. Also, these items did not load on any other factor. There is a concern with this last subscale, temperament, since the SPSS program has identified two factors underlying the factor temperament The last factor temperament had six items loaded on it with values which ranged from a low of .45 to a high of .68 for subfactor 1. The values for subfactor 2 are a low of -.62 to

a high of .59. With two items loading on both subfactors at approximately the same value. These are items R61 and R30, these items load slightly higher on subfactor 2.. Each of these subfactors have three items loading on each of them, but there is some cross loading on to each subfactor by various items. A reading of the items leads this researcher to believe that the factor temperament is being assessed by two perspectives, internal and external expressions of temperamental activities. This is a weak aspect of this study and the study needs to be redone with additional items that will load on the last subscales, helpfulness, uncertainty and temperament.

The second hypothesis is concerned with the reliability of each subscale of the PITBI. Since each of the subscales of the PITBI are based on a Likert scale assessment the appropriate type of reliability analysis is Cronbach's alpha. The leadership & guidance subscale's Cronbach's alpha was found to be .85. This high level of reliability means that the answers from a representative sample can be inferred to its identified population. This subscale's high Cronbach alpha also eliminated the necessity of further adjustment to attain a higher alpha coefficient. The reliability coefficients of the subscales helpfulness and uncertainty were also calculated using Cronbach's formula. The results were alpha coefficients of .67 for each subscale. This level is considered sufficient for individual assessment and remediation actions, but there is not enough certainty to make a clear inference to a representative sample's identified population. The last subscale, temperament, was subjected to reliability analysis using Cronbach's alpha equation. The result was a reliability of .55. This level is considered to low to be used in individual actions nor is it sufficient to infer from a representative sample to its identified population. It is recommended that additional items be added to the subscales,

helpfulness, uncertainty, and temperament to strengthen the reliability coefficients of these scales. It is also recommended that factor analysis be conducted on each of the revised subscales.

The validity of the PITBI as a valid instrument is predicated on the validity of the instrument's subscales. Since the subscales are found to be valid, with the exception of the temperament subscale, the validity of the PITBI is also provisionally found to be valid. Since the PITBI is composed of four differing subscales, Cronbach's alpha can not be used directly to ascertain the reliability of the entire instrument. But, the PITBI can be found to be a reliable instrument because the reliabilities of the subscales are considered adequate. With the exception of the subscale temperament which has a Cronbach alpha reliability coefficient of .55. This level of .55 and the coefficient of .67 for the subscales helpfulness and uncertainty leads this researcher to recommend that additional items be added to all three subscales and that the PITBI be reused in the same university, using the same classes and the same professors. Reliability of the PITBI and its subscales will be determined by using Cronbach's alpha equation.

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